

Appl. No. 10/758,692
Amdt. Dated September 11, 2006
Reply to Office Action of June 13, 2006

Attorney Docket No. 81870.0027
Customer No.: 26021

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled)

2. (Previously presented) An optical isolator element according to claim 3, wherein the bonding surface of at least either one of the Faraday rotator and the polarizers is integrally provided with an anti-reflection multi-layer film made of an inorganic material.

3. (Currently amended) An optical isolator element comprising:

at least one flat Faraday rotator, and

at least two flat polarizers,

wherein the Faraday rotator and the polarizers are bonded to each other by van der Waals forces acting between bonding surfaces thereof,

with the bonding surfaces being brought into contact with each other while the bonding surfaces are activated such that atom bonds are present thereon,

wherein the bonding surfaces of at least either one of the Faraday rotator and the polarizers are integrally provided with films made of a soft material which is softer than a dielectric hard material, wherein the soft material is selected from the group consisting of Au, Al, Ag, Cu, Sn, and Ga.

4-6. (Canceled)

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7. (Previously presented) An optical isolator comprising:
an optical isolator element according to claim 3,
and a magnetic element arranged around the optical isolator element.

8. (Original) An optical isolator element according to claim 7, wherein the
magnetic element is tubular and the optical isolator element is arranged inside the
tubular magnetic element.

9-10. (Canceled)

11. (Currently amended) A method for producing an optical isolator element
including at least one flat Faraday rotator and at least two flat polarizers bonded to
each other via their bonding surfaces, comprising the steps of:

adjusting the relative angular positions of the at least one flat Faraday
rotator and at least two flat polarizers so as to maximize an optical isolation effect.

activating the bonding surfaces of the Faraday rotator and the polarizers
such that atom bonds are present thereon, and

bringing the Faraday rotator and the polarizers having the activated bonding
surfaces into contact with each other in vacuum at room temperature, thereby
bonding the Faraday rotator and the polarizers by van der Waals forces created on
the bonding surfaces of the Faraday rotator and the polarizers,

~~wherein the bonding surfaces of at least either one of the Faraday rotator and
the polarizers are integrally provided with films made of a soft material which is
softer than a dielectric hard material.~~

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12. (Currently amended) A method ~~according to claim 11, for producing an optical isolator element comprising at least one flat Faraday rotator and at least two flat polarizers bonded to each other via their bonding surfaces, comprising the steps of:~~

activating the bonding surfaces of the Faraday rotator and the polarizers such that atomic bonds are present thereon, and

bringing the Faraday rotator and the polarizers having the activated bonding surfaces into contact with each other in a vacuum at room temperature, thereby bonding the Faraday rotator and the polarizers by van der Waals forces created on the bonding surfaces of the Faraday rotator and the polarizers, wherein a step of smoothing the bonding surfaces of the Faraday rotator and the polarizers by chemical mechanical polishing is performed before the step of activating the bonding surfaces of the Faraday rotator and the polarizers, wherein the chemical mechanical polishing step comprises sub-steps of polishing the bonding surface using a polishing pad in ultrapure water, and further polishing the bonding surfaces in a colloidal silica, cleaning the bonding surfaces by ultrapure water in an ultrasonic bath after cleaning the bonding surfaces by an alcohol in an ultrasonic bath, and drying the bonding surfaces.

13. (Previously presented) A method according to claim 11, wherein the bonding surfaces are so smoothed that the surface coarsenesses thereof are 10 nm or below.

14. (Previously presented) A method according to claim 11, wherein a pushing force is exerted to press-contact the Faraday rotator and the polarizers with each other when the Faraday rotator and the polarizers having the bonding surfaces thereof are bonded with each other in vacuum.

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15. (Previously presented) A method according to claim 11, wherein a step of integrally forming an anti-reflection multi-layer film made of an inorganic material on the bonding surfaces of at least either one of the Faraday rotator and the polarizers is performed before the step of activating the bonding surfaces of the Faraday rotator and the polarizers.

16. (Original) A method according to claim 11, wherein a step of integrally forming films made of a soft material on the bonding surfaces of at least either one of the Faraday rotator and the polarizers is performed before the step of activating the bonding surfaces of the Faraday rotator and the polarizers.

17-21. (Canceled)

22. (Previously presented) A method according to claim 11, wherein the step of activating the bonding surfaces is performed by projecting ion beams or neutral atoms onto the bonding surfaces.

23. (New) A method according to claim 11, wherein the at least one flat Faraday rotator and at least two flat polarizers are bonded with each other in the forms of a Faraday rotator base and polarizer bases of particular shapes, the step of adjusting relative angular position includes the sub-steps of measuring the transmitting and polarizing directions in relation to the outer shape of the polarizer bases, the polarization rotation angle of the Faraday rotator base and the polarization characteristics of the polarizer bases and the Faraday rotator base, determining the relative angular positions of the polarizer bases and the Faraday rotator base in accordance with the measurement.

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24. (New) A method according to claim 11, wherein the at least one flat Faraday rotator and at least two flat polarizers are so rotationally adjusted as to minimally transmit a light incident in reverse direction.